WHAT IS CLAIMED IS

1. A method for overcoming stiction in an electro-mechanical system, the method comprising:

providing a base layer;

providing a contact area, wherein the contact area comprises a portion of the base layer or a stop disposed thereon;

providing a structural plate, wherein a side of the structural plate is in contact with the contact area, and wherein a stiction force impedes movement of the structural plate away from the contact area; and

producing a vibration local to the contact area and sufficient to overcome the stiction force.

2. The method of claim 1, wherein the structural plate is one of a plurality of structural plates and the contact area is one of a plurality of contact areas, and wherein each of the structural plates is associated with at least one contact area, the method further comprising:

producing a vibration local to a subset of the contact areas.

3. An electo-mechanical system capable of overcoming stiction forces through localized vibration, the system comprising:

a base layer having a surface;

a device supported above the surface by a pivot, wherein the device is movable along a movement path;

a stop located at a contact position along the movement path, wherein the device contacts the stop at the contact position, and wherein a stiction force between the device and the stop exits at the contact postion; and

a vibration element operable to cause a vibration at or near the contact position, wherein the vibration disrupts the stiction force.

4. The system of claim 3, the system further comprising an device actuator, wherein the device actuator is operable to cause the device to move along the movement path.

5. The system of claim 3, wherein the device is a structural plate, comprising a micro mirror.

6. The system of claim 3, wherein the stop comprises an area of the base layer.

7. The system of claim 6, wherein the vibration element is a mechanical structure operable to repeatedly contact the device at or near the contact point.

8. The system of claim 3, wherein the vibration element comprises a device actuator, wherein the device actuator is operable to cause the device to move relative along the movement path.

9. The system of claim 3, wherein the vibration element is integral to the device.

10. The system of claim 3, wherein the device is a first device, the pivot is a first pivot, the stop is a first stop, the contact position is a first contact position, the movement path is a first movement path, and the vibration device is a first vibration device, the system further comprising:

at least a second device and a second pivot, wherein the second device is supported above the surface by the second pivot, and wherein the second device is movable along a second movement path;

at least a second stop located at a second contact position along the second movement path, wherein the second device contacts the second stop at the second contact position, and wherein the contact between the second device and the second stop is susceptible to a stiction force;

at least a second vibration element operable to cause a vibration at or near the second contact position, wherein the vibration disrupts the stiction force; and

wherein the first and second vibration elements are electrically connected such that the first and second vibration elements are activated together.

11. A method for overcoming stiction in an electro-mechanical system, the method comprising:

providing a base layer;

providing a device supported above a surface of the base layer by a pivot;

providing an actuator disposed on the base layer;

activating the actuator to cause the device to deflect until an end of the device contacts the base layer or a structure disposed thereon at a contact position, wherein further movement of the device is retarded by a stiction force at the contact position;

deactivating the actuator to allow the device to return to a static position; and

vibrating an area at or about the contact position, wherein the vibration disrupts the stiction force.

12. The method of claim 11, wherein the device comprises a structural plate with a micromirror mounted thereon.

13. The method of claim 11, wherein vibrating comprises applying a force to deform an elastic structure at or near the contact position, and subsequently removing the force to allow the elastic structure to reform, and wherein reforming the elastic structure causes a vibration at the contact position.

14. The method of claim 11, wherein the force is a voltage.

15. The method of claim 11, wherein vibrating comprises applying a voltage alternating between a low potential and a high potential at a frequency, and wherein the high potential causes an elastic structure to deform at or near the contact position and the low potential allows the elastic structure to reform, and wherein deforming and reforming the elastic structure causes a vibration at or near the contact position.

16. The method of claim 11, wherein the contact position is associated with a stop structure disposed on the base layer.

17. The method of claim 16, wherein vibrating comprises applying an alternating voltage to the stop structure, and wherein the frequency of the alternating voltage is at or near the natural frequency of the stop structure or a harmonic thereof.

18. A method for overcoming stiction through vibrations localized to areas susceptible to stiction forces, the method comprising:

providing a base layer;

providing at least a first and a second device;

wherein the first device is moveable to contact the base layer or a first structure thereon at a first contact position, and wherein at the first contact position, movement of the first device is susceptible to stiction forces; and

wherein the second device is moveable to contact the base layer or a second structure thereon at a second contact position, and wherein at the second contact position, movement of the second device is susceptible to stiction forces; and

concurrently vibrating an area at or about the first and the second contact positions, wherein the vibration disrupts the stiction forces.

19. The method of claim 18, wherein the device comprises a structural plate with a micromirror mounted thereon.

20. The method of claim 18, wherein vibrating comprises applying a force to deform an elastic structure at or near the first contact position, and subsequently removing the force to allow the elastic structure to reform, and wherein reforming the elastic structure causes a vibration at the first contact position.

21. The method of claim 18, wherein vibrating comprises applying a voltage alternating between a low potential and a high potential at a frequency, and wherein the high potential causes an elastic structure to deform at or near the first contact position and the low potential allows the elastic structure to reform, and wherein deforming and reforming the elastic structure causes a vibration at or near the first contact position.

22. The method of claim 21, wherein the elastic structure is a first elastic structure, the method further comprising:

concurrently applying the voltage to a second elastic structure, wherein deformation and reformation of the second elastic structure causes a vibration at or near the second contact position.

23. The method of claim 18, wherein the first contact position is associated with a first stop structure disposed on the base layer, and wherein the second contact position is associated with a second stop structure disposed on the base layer.

24. The method of claim 23, wherein vibrating comprises applying an alternating voltage to both the first and the second stop structures, and wherein the frequency of the alternating voltage is at or near the natural frequency of the first and the second stop structures or a harmonic thereof.

25. An electro-mechanical system, the system comprising:

a structural plate in contact with a stop; and

an actuator activated by a force for creating a movement of the stop relative to the structural plate, wherein the movement is sufficient to overcome stiction forces between the structural plate and the stop.

26. The system of claim 25, wherein activating the actuator with a force causes the stop to displace from a static position to a displaced position, and wherein the movement results from elastic forces associated with the stop which cause the stop to displace from the displaced position to the static position when the actuator is de-activated.

27. The system of claim 26, wherein the movement comprises an oscillation of the stop.

28. The system of claim 27, wherein the oscillation comprises displacement of the stop from the displaced position passed the static position to an overshoot position and back to the static position.

29. The system of claim 25, the system further comprising a base layer, wherein the structural plate is supported above the substrate by a pivot and the stop is disposed over the base layer.

30. The system of claim 29, the system further comprising a micro-mirror disposed on the structural plate.

31. The system of claim 29, wherein the actuator is a first actuator, the system further comprising a second actuator, wherein application of a DC voltage to the second actuator cause the structural plate to displace and contact the stop.

32. A method of providing localized vibration in an electro-mechanical system, the method comprising:

providing a base layer;

providing a stop disposed over the base layer;

providing a structural plate supported over the base layer by a pivot , wherein the structural plate is moveable to contact the stop;

providing an actuator disposed relative to the stop;

applying a static force to the actuator, wherein the stop displaces from a static position to a displaced position; and

removing the static force from the actuator to cause a movement of the stop relative to the structural plate, wherein the movement is sufficient to overcome stiction forces between the stop and the structural plate.

33. The method of claim 32, wherein the static force is a DC voltage.

34. The method of claim 32, wherein the movement comprises an oscillation of the stop.

35. The method of claim 34, wherein the oscillation comprises displacement of the stop from the displaced position passed the static position to an overshoot position and back to the static position.

36. The method of claim 32, wherein the movement is primarily vertical relative to the base layer.

37. The method of claim 32, wherein the movement is primarily horizontal relative to the base layer.

38. The method of claim 32, wherein the structural plate comprises a micro-mirror disposed thereon.

39. The method of claim 32, wherein the actuator is a first actuator, the method further comprising:

providing a second actuator, wherein activation of the second actuator causes the structural plate to contact the stop; and

activating the second actuator.

40. The method of claim 39, the method further comprising: removing the static force from the first actuator at or about the same time as deactivating the second actuator.

41. An electro-mechanical system, the system comprising:

a mechanical stop;

a structural plate disposed relative to the mechanical stop, wherein a side of the structural plate contacts the mechanical stop; and

an actuator, wherein application of a DC voltage to the actuator causes the mechanical stop to move relative to the structural plate from a static position to a displaced position, and wherein removal of the static force causes a movement of the mechanical stop from the displaced position to the static position, and wherein the movement is sufficient to overcome stiction forces between the structural plate and the mechanical stop.

42. The system of claim 41, wherein the movement comprises an oscillation of the mechanical stop.

43. The system of claim 42, wherein the oscillation comprises displacement of the mechanical stop from the displaced position passed the static position to an overshoot position and back to the static position.

44. The system of claim 41, the system further comprising a base layer, wherein the structural plate is supported above the substrate by a pivot and the mechanical stop is disposed over the base layer.

45. The system of claim 44, wherein the actuator is a first actuator, the system further comprising a second actuator, wherein application of a force to the second actuator causes the structural plate to deflect into contact with the mechanical stop.

46. An optical routing apparatus comprising a moveable micro-mirror, the optical routing apparatus comprising:

a base layer;

a stop disposed over the base layer;

a structural plate supported above the substrate by a pivot, wherein the structural plate is deflectable to contact the stop;

an actuator disposed near the stop, wherein application of a DC voltage to the actuator causes the stop to displace from a static position, and wherein removing the DC voltage allows the stop to displace to the static position, and wherein displacement to the static position creates a movement sufficient to overcome stiction related forces between the stop and the structural plate.

47. The system of claim 46, wherein the movement comprises an oscillation of the stop.

48. The system of claim 46, wherein the movement comprises a combination of horizontal and vertical movement relative to the base layer.

49. The system of claim 46, wherein the actuator is a first actuator, the system further comprising a second actuator, wherein application of a force to the second actuator causes the structural plate to deflect into contact with the stop.

50. An electro-mechanical system, the system comprising:

a structural plate in contact with a stop; and

an actuator activated by an alternating force for creating an oscillating movement of the stop relative to the structural plate, wherein the oscillating movement is sufficient to overcome stiction forces between the structural plate and the stop.

51. The system of claim 50, wherein the alternating force is an AC voltage or a pulsed DC voltage.

52. The system of claim 50, wherein activating the actuator with an alternating force causes the stop to displace to a displaced position when the alternating force is at a first potential, and wherein an elastic force associated with the stop causes the stop to displace toward a static position when the alternating force is at a second potential.

53. The system of claim 52, wherein the oscillating movement results from displacing the stop to the displaced position and returning the stop toward the static position.

54. The system of claim 53, wherein the oscillating movement oscillates at a frequency at or about the frequency of the alternating force.

55. The system of claim 50, the system further comprising a base layer, wherein the structural plate is supported above the base layer by a pivot and the stop is disposed over the base layer.

56. The system of claim 55, wherein the actuator is a first actuator, the system further comprising a second actuator, wherein application of a voltage to the second actuator cause the structural plate to displace and contact the stop.

57. A method of providing localized vibration in an electro-mechanical system, the method comprising:

providing a base layer;

providing a stop disposed over the base layer;

providing a structural plate supported over the base layer by a pivot , wherein the structural plate is moveable to contact the stop;

providing an actuator disposed relative to the stop;

applying an alternating force to the actuator to create a movement of the stop, wherein the stop displaces from a static position to a displaced position when the alternating force is at a first potential and returns toward the static position when the alternating force is at a second potential; and

wherein the movement is sufficient to overcome stiction forces between the stop and the structural plate.

58. The method of claim 57, wherein the alternating force is an AC voltage.

59. The method of claim 57, wherein the movement comprises an oscillation of the stop.

60. The method of claim 59, wherein a frequency of the alternating force determines the frequency of the oscillation.

61. The method of claim 57, wherein the actuator is a first actuator, the method further comprising:

providing a second actuator, wherein activation of the second actuator causes the structural plate to contact the stop; and

activating the second actuator.

62. The method of claim 61, the method further comprising:

de-activating the second actuator at or about the same time as applying an alternating force to the first actuator.

63. An electro-mechanical system, the system comprising:

a mechanical stop;

a structural plate disposed relative to the mechanical stop, wherein a side of the structural plate contacts the mechanical stop; and

an actuator, wherein application of an AC voltage to the actuator causes the mechanical stop to vibrate, and wherein the vibration is sufficient to overcome stiction forces between the structural plate and the mechanical stop.

64. The system of claim 63, wherein the vibration occurs at a frequency at or about the frequency of the AC voltage.

65. An optical routing apparatus comprising a moveable micro-mirror, the optical routing apparatus comprising:

a base layer;

a stop disposed over the base layer;

a structural plate supported above the base layer by a pivot, wherein the structural plate is deflectable to contact the stop; and

an actuator disposed near the stop, wherein application of an AC voltage to the actuator causes the stop to oscillate at a frequency at or about the frequency of the AC voltage, and wherein the oscillation is sufficient to overcome stiction related forces between the stop and the structural plate.

66. The system of claim 65, wherein the oscillation comprises a combination of horizontal and vertical movement relative to the base layer.

67. The system of claim 65, wherein the actuator is a first actuator, the system further comprising a second actuator, wherein application of a force to the second actuator causes the structural plate to deflect into contact with the stop.

68. An electro-mechanical system, the system comprising:

a base layer;

a stop disposed on the base layer;

a structural plate supported above the base layer by a pivot, wherein the structural plate can deflect to contact the stop; and

a contact for receiving a driving force, wherein a frequency of the driving force is at or near the resonant frequency, or a harmonic thereof, of either the stop or the structural plate, and wherein receiving the driving force causes a vibration of the stop relative to the structural plate.

69. The system of claim 68, wherein the driving force is a mechanical force.

70. The system of claim 68, wherein the driving force is sound.

71. The system of claim 68, wherein the driving force is an AC voltage.

72. The system of claim 71, wherein the contact comprises a portion of the stop.

73. The system of claim 71, wherein the contact comprises a portion of the pivot.

74. The system of claim 71, wherein the contact is an electrically conductive lead coupled to the stop.

75. The system of claim 71, wherein the vibration primarily comprises movement of the stop.

76. The system of claim 75, wherein the stop is comprised of a material and the driving force has a frequency at or near the resonant frequency of the material.

77. The system of claim 71, wherein the vibration primarily comprises movement of the structural plate.

78. The system of claim 77, wherein the structural plate comprises a structure connecting a first and a second portion of the structural plate.

79. The system of claim 78, wherein the structure is a serpentine structure.

80. The system of claim 78, wherein the structure is comprised of a material and the driving force has a frequency at or near the resonant frequency of the material.

81. The system of claim 68, the system further comprising an actuator, wherein activation of the actuator causes the structural plate to deflect and contact the stop.

82. The system of claim 81, wherein the actuator is integral to the stop.

83. A method of providing localized vibration in an electro-mechanical system, the method comprising:

providing a base layer;

providing a stop disposed over the base layer;

providing a structural plate supported over the base layer by a pivot , wherein the structural plate is moveable to contact the stop;

applying a driving force to the stop, wherein a frequency of the driving force is at or near the resonant frequency, or a harmonic thereof, of either the stop or the structural plate, and wherein the driving force causes a vibration of the stop relative to the structural plate; and

wherein the movement is sufficient to overcome stiction forces between the stop and the structural plate.

84. The method of claim 83, wherein the driving force is an AC voltage.

85. The method of claim 83, wherein the stop comprises a material and the vibration comprises a vibration of the stop at or near the resonant frequency of the material.

86. The method of claim 83, wherein the structural plate comprises a material and the vibration comprises a vibration of the structural plate at or near the resonant frequency of the material.

87. The method of claim 83, wherein the structural plate comprises a structure disposed between a first and second portions of the structural plate.

88. The method of claim 87, wherein the vibration comprises a vibration of the structural plate at or near the resonant frequency of the structure.

89. The method of claim 83, wherein the structural plate comprises a micro-mirror disposed thereon.

90. An electro-mechanical system, the system comprising:

a base layer;

a structural plate supported above the base layer by a pivot, wherein a first portion of the structural plate contacts the base layer or a stop disposed on the base layer, and a second portion of the structural plate contacts the pivot, and wherein a structure is disposed between the first and the second portions;

a driving force, wherein the driving force has a frequency at or near the natural frequency, or a harmonic thereof, of the structure; and

wherein the driving force causes a vibration of the structural plate relative to the base layer, the vibration sufficient to overcome stiction related forces between the base layer and the structural plate.

91. The system of claim 90, wherein the structure is comprised of a material and the driving force has a frequency at or near the natural frequency of the material.